

Bellwork: 1/28/13

The height "y" (in feet) of a ball thrown by a boy is $y = (-1/2)x^2 + 2x + 6$ where "x" is the horizontal distance (in feet) from where the ball is thrown.

a) How high is the ball when it is at its maximum height?

$$-\frac{b}{2a} = \frac{-2}{2(-1/2)} = \frac{-2}{-1} = 2 \quad -\frac{1}{2}(2)^2 + 2(2) + 6 = 8$$

The maximum height of the ball is 8 ft.

b) How far from the boy does the ball strike the ground?

$$0 = -\frac{1}{2}x^2 + 2x + 6$$
$$\frac{-2 \pm \sqrt{(2)^2 - 4(-\frac{1}{2})(6)}}{2(-\frac{1}{2})} = \frac{-2 \pm \sqrt{16}}{-1} \begin{cases} \frac{-2 + \sqrt{16}}{-1} = -2 \\ \frac{-2 - \sqrt{16}}{-1} = 6 \end{cases}$$

The boy threw the ball 6 feet.

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$$y = -\frac{1}{2}x^2 + 2x + 2.5$$

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$$0 = -\frac{1}{2}x^2 + 2x + 2.5$$
$$\frac{-2 \pm \sqrt{2^2 - 4(-\frac{1}{2})(2.5)}}{2(-\frac{1}{2})} = \frac{-2 \pm \sqrt{9}}{-1} \begin{cases} \frac{-2 + \sqrt{9}}{-1} = -1 \\ \frac{-2 - \sqrt{9}}{-1} = 5 \end{cases}$$

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- 1) A pumpkin is thrown from a 105 feet tall catapult. The flight of the pumpkin is modeled by $h(t) = -5t^2 + 20t + 105$. Use this function to answer the following questions.

a. What's the height of the pumpkin after 4.8 seconds?

$$h(t) = -5(4.8)^2 + 20(4.8) + 105$$

$$= 85.8 \text{ ft}$$

The height of the pumpkin after 4.8 seconds is 85.8 ft.

b. After how many seconds does the pumpkin reach its maximum height?

$$-\frac{b}{2a} = \frac{-20}{2(-5)} = \frac{-20}{-10} = 2 \text{ seconds.}$$

The pumpkin reaches its maximum height after 2 seconds.

c. What's the maximum height of the pumpkin?

$$h(t) = -5(2)^2 + 20(2) + 105 = 125 \text{ ft.}$$

The maximum height of the pumpkin is 125 ft.

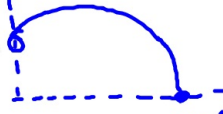
d. What's the total flight time of the pumpkin?

$$0 = -5t^2 + 20t + 105$$

$$\frac{-20 \pm \sqrt{20^2 - 4(-5)(105)}}{2(-5)} = \frac{-20 \pm \sqrt{2500}}{-10}$$

$$\left\{ \begin{array}{l} \frac{-20 + \sqrt{2500}}{-10} = -3 \\ \frac{-20 - \sqrt{2500}}{-10} = 7 \end{array} \right.$$

The total flight time of the pumpkin is 7 seconds.



- 2) A pumpkin is thrown from a 40 feet tall catapult. The flight of the pumpkin is modeled by $h(t) = -32t^2 + 152t + 40$. Use this function to answer the following questions.

a. What's the height of the pumpkin after 2.5 seconds?

b. After how many seconds does the pumpkin reach its maximum height?

c. What's the maximum height of the pumpkin?

d. What's the total flight time of the pumpkin?

